We Claim:

1. A semiconductor device comprising at least one transistor on a semiconductor substrate, wherein

said at least one transistor comprises:

a semiconductor layer of a first conductivity type which is formed in a surface of said semiconductor substrate;

a channel dope layer of the first conductivity type which is formed selectively in said semiconductor layer; and

a control electrode which is formed at a position which faces said channel dope layer, above said semiconductor layer,

said control electrode comprises a polysilicon layer which internally includes an impurity of a second conductivity type and nitrogen, and

said nitrogen is introduced to a lower portion of said polysilicon layer in such a manner that said impurity has a relatively high concentration in an upper portion of said polysilicon layer but has a relatively low concentration in said lower portion of said polysilicon layer.

2. The semiconductor device of claim 1, wherein said at least one transistor includes at least two types of transistors, and said at least two types of transistors are structured so that concentrations of said nitrogen are different between said at least two types of transistors.

3. The semiconductor device of claim 2, wherein said at least two types of transistors include a first to a third types of transistors,

said first type of transistor comprises:

a pair of first semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said first type of transistor; and

a first gate oxide film which is formed on said semiconductor layer of said first type of transistor, between said pair of first semiconductor regions,

said channel dope layer of said first type of transistor is formed between said pair of first semiconductor regions,

said control electrode of said first type of transistor includes:

a first polysilicon layer which is formed on said first gate oxide film; and

a first nitrogen-introduced region which is formed within said first polysilicon layer,

said second type of transistor comprises:

a pair of second semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said second type of transistor; and

a second gate oxide film which is formed on said semiconductor layer of said second type of transistor, between said pair of second semiconductor regions,

said channel dope layer of said second type of transistor is formed between said pair of second semiconductor regions,

said control electrode of said second type of transistor includes:

a second polysilicon layer which is formed on said second gate oxide film; and

a second nitrogen-introduced region which is formed within said second polysilicon layer,

said third type of transistor comprises:

a pair of third semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said third type of transistor; and

a third gate oxide film which is formed on said semiconductor layer of said third type of transistor, between said pair of third semiconductor regions;

said channel dope layer of said third type of transistor is formed between said pair of third semiconductor regions,

said control electrode of said third type of transistor includes:

a third polysilicon layer which is formed on said third gate oxide film; and

a third nitrogen-introduced region which is formed within said third polysilicon layer,

concentrations of said first to third nitrogen-introduced regions are different from each other,

said first to said third gate oxide films have the same thickness, and

said channel dope layers of said transistors of said first to said third types have the same impurity concentrations.

4. The semiconductor device of claim 2, wherein said at least two types of transistors includes a first to a third types of transistors,

said first type of transistor comprises:

a pair of first semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said first type of transistor; and

a first gate oxide film which is formed on said semiconductor layer of said

first type of transistor, between said pair of first semiconductor regions,

said channel dope layer of said first type of transistor is formed between said pair of first semiconductor regions,

said control electrode of said first type of transistor includes:

a first polysilicon layer which is formed on said first gate oxide film; and

a first nitrogen-introduced region which is formed within said first polysilicon layer,

said second type of transistor comprises:

a pair of second semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said second type of transistor; and

a second gate oxide film which is formed on said semiconductor layer of said second type of transistor, between said pair of second semiconductor regions,

said channel dope layer of said second type of transistor is formed between said pair of second semiconductor regions,

said control electrode of said second type of transistor includes:

a second polysilicon layer which is formed on said second gate oxide film; and

a second nitrogen-introduced region which is formed within said second polysilicon layer,

said third type of transistor comprises:

a pair of third semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said third type of transistor;

a third gate oxide film which is formed on said semiconductor layer of said

third type of transistor, between said pair of third semiconductor regions;

a floating gate electrode which is formed on said third gate oxide film; and

an inter-layer insulation film which is formed on said floating gate electrode,

said channel dope layer of said third type of transistor is formed between said pair of third semiconductor regions,

said control electrode of said third type of transistor includes:

a third polysilicon layer which is formed on said third gate oxide film; and

a third nitrogen-introduced region which is formed within said third polysilicon layer,

a concentration of said first nitrogen-introduced region is higher than those of said second and said third nitrogen-introduced regions,

said first and said second gate oxide films have the same thickness which is a first thickness, while said third gate oxide film has a second thickness which is thicker than said first thickness, and

said channel dope layers of said transistors of said first to said third types have the same impurity concentrations.

5. The semiconductor device of claim 2, wherein said at least two types of transistors includes a first to a third types of transistors,

said first type of transistor comprises:

a pair of first semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said first type of transistor; and

a first gate oxide film which is formed on said semiconductor layer of said first type of transistor, between said pair of first semiconductor regions,

said channel dope layer is formed between said pair of first semiconductor regions,

said control electrode of said first type of transistor includes:

a first polysilicon layer which is formed on said first gate oxide film; and

a first nitrogen–introduced region which is formed within said first polysilicon layer,

said second type of transistor comprises:

a pair of second semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said second type of transistor; and

a second gate oxide film which is formed on said semiconductor layer of said second type of transistor, between said pair of second semiconductor regions,

said channel dope layer of said second type of transistor is formed between said pair of second semiconductor regions,

said second control electrode of said second type of transistor includes:

a second polysilicon layer which is formed on said second gate oxide film; and

a second nitrogen–introduced region which is formed within said second polysilicon layer,

said third type of transistor comprises:

a pair of third semiconductor regions of the second conductivity type formed selectively and independently of each other within said semiconductor layer of said third type of transistor;

a third gate oxide film which is formed on said semiconductor layer of said third type of transistor, between said pair of third semiconductor regions;

said channel dope layer of said third type of transistor is formed between said pair of third semiconductor regions,

said control electrode of said third type of transistor includes:

a third polysilicon layer which is formed on said third gate oxide film; and

a third nitrogen-introduced region which is formed within said third polysilicon layer,

a concentration of said third nitrogen-introduced region is higher than those of said first and said second nitrogen-introduced regions,

said first to said third gate oxide films have the same thickness, and

said channel dope layers of said transistors of said first and said third types have the same impurity concentrations.

6. A semiconductor device including at least one transistor on a semiconductor substrate, wherein

said at least one transistor comprises:

an active region which is defined by a field oxide film which is selectively formed on a major surface of said semiconductor substrate;

an oxide film which is formed on said active region; and

a control electrode which is formed on said oxide film and said field oxide film, said control electrode internally including a polysilicon layer into which an impurity of the same conductivity type as a source/drain layer and nitrogen are introduced, and

said nitrogen is selectively introduced to a lower portion of said polysilicon layer on an edge portion of said active region in such a manner that said impurity has a relatively high concentration in an upper portion of said polysilicon layer but

has a relatively low concentration in said lower portion of said polysilicon layer.

7. The semiconductor device of claim 6, wherein said nitrogen is introduced at a dose of $1 \times 10^{15}/cm^2$ to $1 \times 10^{16}/cm^2$.

8. A semiconductor device including at least one transistor on a semiconductor substrate, wherein

said at least one transistor comprises:

an active region which is defined by a field oxide film which is selectively formed on a major surface of said semiconductor substrate;

an oxide film which is formed on said active region; and

a control electrode which is formed on said oxide film and said field oxide film, said control electrode internally including a first polysilicon layer into which nitrogen is introduced and a second polysilicon layer into which an impurity of the same conductivity type as a source/drain layer is introduced.

9. The semiconductor device of claim 8, wherein said nitrogen is introduced at a dose of $1 \times 10^{15}/cm^2$ to $1 \times 10^{16}/cm^2$.

10. A method of manufacturing a semiconductor device in which there are at least one transistor on a semiconductor substrate, comprising the steps of:

(a) forming a semiconductor layer of a first conductivity type within a surface of said semiconductor substrate, at a position where said at least one transistor is formed;

(b) selectively forming a channel dope layer of the first conductivity type

within said semiconductor layer of said at least one transistor, by ion implantation; and

(c) forming a control electrode above said semiconductor layer of said at least one transistor, at a position facing said channel dope layer, wherein

said step (c) includes a step (c−1) of forming a polysilicon layer which includes an impurity of a second conductivity type and nitrogen, and

said step (c−1) includes a step of introducing said nitrogen to a lower portion of said polysilicon layer.

11. The method of manufacturing a semiconductor device of claim 10, wherein said at least one transistor includes a first to a third types of transistors,

said step (c) comprises the steps of:

forming an oxide film on said semiconductor layers of said first to the third types of transistors;

forming a first polysilicon layer on said oxide film;

introducing an impurity of the second conductivity type into said first polysilicon layer, to thereby form a second polysilicon layer;

introducing nitrogen into a lower portion of said second polysilicon layer at a dose n1, to thereby form a first nitrogen region;

masking over said second polysilicon layer at a position at which said first type of transistor is formed and introducing nitrogen into said first nitrogen region within a remaining portion of said second polysilicon layer at a dose n2 to thereby form a second nitrogen region;

masking over said second polysilicon layer at a position at which said second type of transistor is formed and introducing nitrogen into said second nitrogen

region within a remaining portion of said second polysilicon layer at a dose n3 to thereby form a third nitrogen region; and

selectively removing said second polysilicon layer and said oxide film by patterning, to thereby form:

a first gate oxide film and said control electrode of said first type of transistor, on said semiconductor layer of said first type of transistor;

a second gate oxide film and said control electrode of said second type of transistor, on said semiconductor layer of said second type of transistor; and

a third gate oxide film and said control electrode of said third type of transistor, on said semiconductor layer of said third type of transistor.

12. The method of manufacturing a semiconductor device of claim 10, wherein said at least one transistor includes a first to a third types of transistors,

said step (c) comprises the steps of:

forming a first oxide film having a first thickness on said semiconductor layers of said first to said third types of transistors;

selectively forming a first polysilicon layer which uniformly has an impurity of the second conductivity type on said first oxide film on said semiconductor layer of said 1st & third types of transistor;

selectively forming an insulation film on said first polysilicon layer while removing said first oxide film at positions where said first and said second types of transistors are formed;

forming a second oxide film having a second thickness which is thinner than said first thickness on said semiconductor layer of said first of transistor and said second types of transistor;

forming a second polysilicon layer on said second oxide film and said insulation film;

introducing nitrogen into a lower portion of said second polysilicon layer at a dose n1 to thereby form a first nitrogen region;

masking over said second polysilicon layer at a position at which said second and said third types of transistors are formed and introducing nitrogen into said first nitrogen region within a remaining portion of said second polysilicon layer at a dose n2 to thereby form a second nitrogen region; and

selectively removing said second polysilicon layer and said first and said second oxide films by patterning, to thereby form:

a first gate oxide film and said control electrode of said first type of transistor, on said semiconductor layer of said first type of transistor;

a second gate oxide film and said control electrode of said second type of transistor, on said semiconductor layer of said second type of transistor; and

a third gate oxide film, a floating gate electrode, an inter-layer insulation film and said control electrode of said third type of transistor, on said semiconductor layer of said third type of transistor.

13. The method of manufacturing a semiconductor device of claim 10, wherein said at least one transistor includes a first to a third types of transistors,

said step (b) comprises a step of forming said channel dope layers of said first and said third types of transistors so that said channel dope layers have the same impurity concentration,

said step (c) comprises the steps of:

a step of forming an oxide film on said semiconductor layers of said first to

said third types of transistors;

forming a first polysilicon layer on said oxide film;

introducing an impurity of the second conductivity type into said first polysilicon layer thereby form a second polysilicon layer;

introducing nitrogen into a lower portion of said second polysilicon layer at a dose n1 to thereby form a first nitrogen region;

masking over said second polysilicon layer at a position at which said first and said second types of transistors are formed and introducing nitrogen into said first nitrogen region within a remaining portion of said second polysilicon layer at a dose n2 to thereby form a second nitrogen region; and

selectively removing said second polysilicon layer and said oxide film by patterning, to thereby form:

a first gate oxide film and said control electrode of said first type of transistor, on said semiconductor layer of said first type of transistor;

a second gate oxide film and said control electrode of said second type of transistor, on said semiconductor layer of said second type of transistor; and

a third gate oxide film and said control electrode of said third type of transistor, on said semiconductor layer of said third type of transistor.

add C'

add B'